



George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

QD-R-008
REVISION E

EFFECTIVE DATE: October 1, 2004

ORGANIZATIONAL INSTRUCTION

RELIABILITY ALLOCATION

OPR(s)

**QD10, QD20, QD30
and QD40**

OPR DESIGNEE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		11/20/97	
Revision	A	7/1/99	Changes made to reflect new organization code changes and/or Changes made to reflect new directives renumbering scheme and to incorporate the corrective action for closure of NCR 266
	B	7/7/01	Changed OPR and OPR Designee. Added Quality Records table.
Revision	C	9/09/02	Format and numbering change to implement requirements of QS-A-001 rev F.
Revision	D	10/21/03	Added applicable and reference documents, revised Instructions
Revision	E	10/1/04	Updated OI to implement HQ Rules Review in accordance with CAITS Action # 04-DA-01-0387) (Utilizing the word "Shall" for all requirements, removing ambiguity, removing non-requirements, etc.)

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Reliability Allocation

1. PURPOSE, SCOPE, APPLICABILITY

1.1 Purpose

The purpose of this Organizational Instruction (OI) is to provide procedures that **shall be** used to allocate system reliability requirements or goals down to the subsystem and component level.

1.2 Scope

This OI describes the S&MA responsibility that shall be performed for flight hardware/software for reliability allocation. Reliability allocation is the process of subdividing a system reliability requirement or goal into subsystem and component requirements or goals.

1.3 Applicability

This OI **shall be** applicable to all S&MA personnel supporting MSFC programs and projects that require or specify reliability requirements.

2. DOCUMENTS (Applicable and Reference)

2.1 Applicable Documents

NPD 8720.1 NASA Reliability and Maintainability (R&M) Program Policy

NASA-STD-8729.1 Planning, Developing and Managing an Effective Reliability and Maintainability (R&M) Program

2.2 Reference Documents

Reliability in Engineering Design, K.C. Kapur and L.R. Lamberson, 1977, p. 405-414.

Handbook of Reliability Engineering and Management, W.G. Ireson and C.F. Coombs Jr., 1988, p. 18.34-18.42.

Reliability Toolkit: A Practical Guide for Commercial Products and Military Systems Under Acquisition Reform, Reliability Analysis Center

3. DEFINITIONS

All definitions applicable to this OI are addressed in NASA-STD-8729.1

4. INSTRUCTIONS

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A system reliability requirement or goal shall be specified prior to performing a reliability allocation to the lower subsystem and component level. To perform the reliability allocation, relevant information is needed pertaining to data on other similar systems and information regarding the current system design. This shall include information regarding the complexity and function of the system/subsystem. The instruction steps are outlined below and are referenced in the Flow Diagram in Section 11. The reliability allocation shall be updated as appropriate (i.e., with design changes or design evolution).

<u>Steps</u>	<u>Action</u>
4.1	Identify the system and elements, which are being evaluated. Define system reliability requirement or goal.
4.2	Establish subsystem reliability weighting factors and rationale and/or reference sources.
4.3	Perform system/subsystem allocation.
4.4	Perform reliability predictions; report analysis results.
4.4.1	Determine if reliability requirements or goals are met.
4.4.2	Determine if re-allocation is feasible and show rationale.
4.4.3	Re-allocate reliability.
4.4.4	Determine if requirements or goals are met.
4.4.5	Determine if design changes are feasible.
4.4.6	If yes, incorporate design changes; update estimates.
4.4.7	If not, management accepts design risk.
4.5	Finalize system/subsystem requirement or goal.

5. NOTES

5.1 Directive Replacement. This Directive replaces S&MA-CR10-R-Y-008, Reliability Allocation.

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5.2 Records:

<u>Records</u>	<u>Repository</u>	<u>Period of Time</u>
Reliability Allocation Report	Hardcopy maintained in R&M files in Building 4471 Room A105	Retain until end of program plus 3 years.

6. SAFETY PRECAUTIONS AND WARNING NOTES

None.

7. APPENDICES, DATA, REPORTS, AND FORMS

None.

8. RECORDS

None

9. TOOLS, EQUIPMENT, AND MATERIALS

The user shall define any tools, special equipment, or materials used during the reliability allocation process.

10. PERSONNEL TRAINING AND CERTIFICATION

Reliability training shall include reliability allocation.

11. FLOW DIAGRAM

The following flow diagram represents the Reliability Allocation instructions outlined in Section 4.

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